

Serial No. 09/977,681

### REMARKS

Reconsideration of the present application is respectfully requested.

Applicants would like to thank the Examiner for the courtesies extended to Kerry S. Culpepper, Esq., Reg. No. 45,672 during a telephonic interview on April 28, 2003, during which the merits of the Examiner's final rejection and proposed amendments were discussed.

Claims 6 – 8 and 11 have been rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 3,893,228 to George *et al.* (George). For the reasons discussed below, claims 6 and 8, as amended and claims 7 and 11 are now in condition for allowance.

Claim 6 has been amended into independent form to include the limitations of claim 10. The Examiner indicated that claim 10 would be allowed if it was rewritten in independent form to include all of the limitations of its base claim (claim 6).

Therefore, because claim 6 has been amended to include the allowable subject matter of claim 10, it is respectfully requested that the rejection of claim 6 as well as dependent claim 8 under 35 U.S.C. 102(b) be withdrawn.

In order to preserve the dependency of claim 8, claim 6 was amended to include the limitations of objected claim 10 rather than amending claim 10 to include the limitations of claim 6. Therefore, this amendment to claim 6 amounts to nothing more than the correction of a cosmetic defect and has not narrowed the scope of claim 10 within the meaning defined in Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., 535 U.S. 722 (2002).

Regarding the rejection of claim 7, claim 7 has been amended into independent form to include the limitations of its base claim (claim 6). Claim 7 recites the novel embodiment disclosed, for example, on pg. 7, lines 20 – pg. 8, line 1 in which the corners 2b of the cavity 2c

Serial No. 09/977,681

are rounded. More particularly, the rounded corners 2b are formed by electrochemical isotropic etching of the cavity 2c. The rounded corners 2b result in an improvement in the mechanical strength of the diaphragm 2a. Further, because the voltage is supplied through the diffused contact 4b and the diffused layer 4a, leakage current in the isotropic etching process is suppressed. The diffused layer 4a has the same conductivity type as the rear portion in which the cavity 2c is located.

George discloses a silicon pressure sensor that includes a body 11 (rear portion), an intermediate layer 12 of  $P^+$  type doped silicon and an epitaxial layer 14 of  $N^-$  type conductivity grown over the intermediate layer 12. The body 11 includes a cavity having sloped interior side walls 24.

However, George fails to disclose a cavity with rounded corners. Rather, as stated by the Examiner, George discloses a substrate in which the interior sides 24 of the substrate 11 are sloped. It has been asserted in ¶ 2a of the Office Action that the corners of the interior sides 24 are "rounded" relative to if the walls formed 90 degree angles. Applicants respectfully disagree, as the corners of the interior sides 24 cannot be considered rounded relative to any angle. Rather, the interior sides of George maintain sharp corners as those shown in FIG. 2C of the present application prior to the electrochemical etching. As disclosed on, for example, pg. 1, lines 22 – 24, these sharp corners will reduce the mechanical strength of the thin diaphragm because stress will be concentrated at the sharp corners.

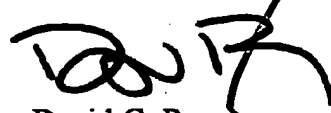
Therefore, because George fails to disclose that the interior sides 24 of the substrate 11 are rounded as recited in amended claim 7, it is respectfully requested that the final rejection of claim 7 as well as dependent claim 11 under 35 U.S.C. 102(b) be withdrawn.

Serial No. 09/977,681

In view of the above amendments and remarks, the present application is now believed to be in condition for allowance. A prompt notice to that effect is respectfully requested.

Permission is given to charge any unanticipated fees to Deposit Account 50-1147.

Respectfully submitted,



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Serial No. 09/977,681

**MARKED-UP VERSION OF THE AMENDMENTS**

The claims have been amended as follows:

6. (Currently Amended) A semiconductor sensor chip comprising:

a semiconductor substrate having a front portion and a rear portion, the front portion and the rear portion having a different conductivity to form a P-N junction plane parallel to front and rear surfaces of the semiconductor substrate;

a sensing element disposed in the front portion at a vicinity of the front surface of the semiconductor substrate;

a diaphragm contoured by a cavity extending from the rear surface into the rear portion of the semiconductor substrate; and

a diffused layer disposed on and along the P-N junction plane and exposed to a side surface of the semiconductor sensor chip, the diffused layer having a same conductivity type as the rear portion where the cavity is located and having an impurity density higher than an impurity density of the rear portion of the semiconductor substrate,

wherein the diffused layer has a pattern for permitting the front and rear portions to directly contact each other at a position below the diaphragm.

7. (Currently Amended) The A semiconductor sensor chip as in claim 6, wherein:  
comprising:

a semiconductor substrate having a front portion and a rear portion, the front portion and the rear portion having a different conductivity to form a P-N junction plane parallel to front and rear surfaces of the semiconductor substrate;

Serial N . 09/977,681

a sensing element disposed in the front portion at a vicinity of the front surface of the semiconductor substrate;

a diaphragm contoured by a cavity extending from the rear surface into the rear portion of the semiconductor substrate; and

a diffused layer disposed on and along the P-N junction plane and exposed to a side surface of the semiconductor sensor chip, the diffused layer having a same conductivity type as the rear portion where the cavity is located and having an impurity density higher than an impurity density of the rear portion of the semiconductor substrate, wherein corners of the cavity are rounded.

11. (Currently Amended) The semiconductor sensor chip as in claim 6 ~~7~~, wherein the diffused layer is for preventing P-N junction plane leakage current.